WHAT IS CLAIMED IS:

1. A pulse wave measuring apparatus comprising:

a photoelectric sensor having a light-emitting portion positionable to emit light to a vessel under a skin of a patient, and a light-receiving portion positionable to receive reflected light from the vessel;

a blood pressure meter; and

a control portion adapted to determine a pulse wave based upon a time-dependent change of a state of the vessel based on the reflected light.

2. A pulse wave measuring apparatus according to claim 1, wherein the control portion is adapted to determine a time-dependent change of a state of a position of a surface of the vessel based on the reflected light.

3. A pulse wave measuring apparatus according to claim 1, wherein the control portion is adapted to determine a time-dependent change of a state of a photoelectric volume pulse wave of the vessel based on the reflected light.

4. A pulse wave measuring apparatus according to claim 1,

wherein the blood pressure meter is adapted to measure a maximum blood pressure and a minimum blood pressure of the patient,

wherein the control portion is adapted to calculate a first value in which the maximum blood pressure and the pulse wave at the time of measurement of the maximum blood pressure are associated, and

wherein the control portion is adapted to calculate a second value in which the minimum blood pressure and the pulse wave at the time of measurement of the minimum blood pressure are associated.

5. A pulse wave measuring apparatus according to claim 4, wherein the control portion is adapted to calculate the maximum blood pressure and the minimum blood pressure from a maximum value and a minimum value of a newly measured pulse wave for each stroke based on the first value and the second value.

6. A pulse wave measuring apparatus according to claim 1, further comprising a cuff expandable to press the vessel,

wherein the blood pressure meter comprises a pressure sensor positioned to press against the vessel via the skin of the patient upon expansion of the cuff, and that determines blood pressure based upon an occurrence of the disappearance of a pressure pulse wave during a process of increasing a pressing force from the cuff, and upon the reappearance of a pressure pulse wave during a process of decreasing the pressing force from the cuff.

7. A pulse wave measuring apparatus according to claim 1, further comprising:

a wristband where the photoelectric sensor is mounted; and

an elastic member that is disposed between the photoelectric sensor and the wristband and that produces an elastic force capable of pressing the photoelectric sensor against the vessel via the skin to such an extent that a blood stream is not stopped.

8. A pulse wave measuring apparatus according to claim 7, further comprising:

an angle sensor adapted to detect an inclination angle of an arm with respect to a heart; and

a compensating portion adapted to compensate the pulse wave based on an output of the angle sensor.

9. A pulse wave measuring apparatus according to claim 1, further comprising a body motion-detecting photoelectric sensor having a light-emitting portion positionable to emit light to the skin of the patient and a light-receiving portion positionable to receive reflected light from the skin,

wherein the control portion determines a body motion of the patient based on the reflected light from the skin.

10. A pulse wave measuring apparatus according to claim 9, further comprising:

a filter portion that removes a predetermined frequency component from an output signal outputted from the photoelectric sensor and an output signal outputted

from the body motion-detecting photoelectric sensor; and

a pulse wave correcting portion that corrects the pulse wave for an amount of the body motion based on the output signal from the photoelectric sensor and the output signal from the body motion-detecting photoelectric sensor which have been passed through the filter portion.

11. A pulse wave measuring apparatus according to claim 1, wherein the control portion is adapted to calculate a heart rate based on the pulse wave.

12. A pulse wave measuring apparatus according to claim 1, wherein the control portion is adapted to adjust an amount of light outputted from the light-emitting portion in accordance with the patient.

13. A pulse wave measuring apparatus according to claim 1, further comprising an amplifier portion adapted to amplify a light-reception signal outputted from the light-emitting portion,

wherein the amplifier portion adjusts an amplification factor of the light-reception signal so as to contain the light-reception signal within a predetermined range.

14. A pulse wave measuring apparatus according to claim 1, wherein the control portion is adapted to calculate an amount of flow of a blood based on the pulse wave.

15. A pulse wave measuring apparatus according to claim 1, wherein the control portion is adapted to detect a state of the vessel based on the pulse wave, and to measure an anesthetic depth of the patient based on the state of the vessel.

16. A pulse wave measuring apparatus according to claim 1, further comprising a second photoelectric sensor having a light-emitting portion positionable to emit light to the vessel under a skin at a position apart from the photoelectric sensor, and a light-receiving portion positionable to receives reflected light from the vessel,

wherein the control portion is adapted to diagnose whether there is an abnormality due to a constriction of a coronary artery of the patient by comparing a pulse wave as a time-dependent change of the vessel which is obtained from the reflected light

received by the photoelectric sensor and a pulse wave as a time-dependent change of the vessel which is obtained from the reflected light received by the second photoelectric sensor.

17. A pulse wave measuring apparatus comprising:

a photoelectric sensor which has a light-emitting portion that emits a light to a heart under a skin of a chest of a patient and a light-receiving portion that receives a reflected light from the heart, and which detects a position of a surface of the heart from an amount of the reflected light;

a blood pressure meter; and

a control portion that measures, as a pulse wave, a time-dependent change of the position of the surface of the heart based on the reflected light.

18. A pulse wave measuring method comprising:

emitting a light to a vessel under a skin of a patient;

receiving a reflected light from the vessel; and

determining, as a pulse wave, a time-dependent change of a state of the vessel based on the reflected light.

19. A pulse wave measuring method according to claim 18, wherein a time-dependent change of a state of a position of a surface of the vessel is determining based on the reflected light.

20. A pulse wave measuring method according to claim 18, wherein a time-dependent change of a state of a photoelectric volume pulse wave of the vessel is determined based on the reflected light.

21. A pulse wave measuring method according to claim 18, further comprising:

measuring a maximum blood pressure and a minimum blood pressure of the patient; and

recording the pulse wave measured,

wherein a first value in which the maximum blood pressure and the pulse wave at

the time of measurement of the maximum blood pressure are associated is calculated, and

wherein a second value in which the minimum blood pressure and the pulse wave at the time of measurement of the minimum blood pressure are associated is calculated.

22. A pulse wave measuring method according to claim 21, wherein the maximum blood pressure and the minimum blood pressure during each stroke are calculated from a maximum value and a minimum value of a newly measured pulse wave for each stroke based on the first value and the second value.

23. A pulse wave measuring method according to claim 21, further comprising:

applying a pressing force to the vessel; and

determining a blood pressure occurring when a pressure pulse wave disappears during a process of increasing the pressing force, and a blood pressure occurring when a pressure pulse wave appears during a process of decreasing the pressing force.

24. A pulse wave measuring method according to claim 23, wherein the pulse wave detected at a wrist of the patient is compensated based on a positional relationship between the wrist and the heart.

25. A pulse wave measuring method according to claim 18, further comprising emitting a light to the skin of the patient, and measuring a body motion of the patient based on a reflected light from the skin.

26. A pulse wave measuring method according to claim 25, further comprising:

removing a predetermined frequency component from a signal obtained from the reflected light; and

performing a correction for an amount of the body motion based on a result of removal of the predetermined frequency component.

27. A pulse wave measuring method according to claim 18, wherein a heart rate is calculated based on the pulse wave.

28. A pulse wave measuring method according to claim 18, wherein an amount of the light is adjusted in accordance with the patient.

29. A pulse wave measuring method according to claim 18, wherein an amplification factor of the light-reception signal is automatically adjusted so as to contain the light-reception signal within a predetermined range.

30. A pulse wave measuring method according to claim 18, wherein an amount of flow of a blood is calculated based on the pulse wave.

31. A pulse wave measuring method according to claim 18, wherein a state of the vessel is determined based on the pulse wave, and an anesthetic depth of the patient is determined based on the state of the vessel.

32. A pulse wave measuring method according to claim 18, further comprising:

emitting a light to the vessel under a skin at a position apart from the skin;

receiving a reflected light from the vessel;

measuring a blood pressure of the patient;

determining, as a second pulse wave, a time-dependent change of the vessel based on the reflected light; and

diagnosing whether there is an abnormality due to a constriction of a coronary artery of the patient by comparing the pulse wave and the second pulse wave.

33. A pulse wave measuring method according to claim 18, wherein a maximum blood pressure and a minimum blood pressure are calculated based on a pulse wave area obtained from the pressure pulse wave.

34. A pulse wave measuring method according to claim 18, wherein an arterial cardiac output, an amount of flow of a blood, and a degree of blood oxygen saturation are serially calculated from the determined pulse wave.

35. A pulse wave measuring method according to claim 18, wherein if a pulse wave is not determined due to an external effect, an average value of past pulse waves is used as a substitute.

36. A pulse wave measuring method comprising:

emitting a light to a heart under a skin of a chest of a patient;

receiving a reflected light from the heart;

measuring a blood pressure of the patient; and

determining, as a pulse wave, a time-dependent change of a state of a heart based on the reflected light.